

**REMARKS**

Claims 1-15 are pending in the present application. Claims 1, 6, and 11 were amended to recite sharing data between pixels. These amendments were made to more clearly recite the inventive concept. No new matter has been added by any of the amendments to the specification, as support for these amendments is found within pages 8, line 19 to page 14, line 23. In particular, sharing data is indicated in equation 26, which shows that the partial derivative of  $s$  (for pixel 0) with respect to  $x$  can be generated using the  $Q$  values from adjacent pixels. Data sharing is also shown in equations 29-32, where it is shown that only four differences are created, where normally each pixel would have to generate these four differences (4 times the number of subtracts). Reconsideration of the claims in light of these amendments and remarks is respectfully requested.

**I. 35 U.S.C. § 102, Anticipation, Claims 1-15**

The Examiner has rejected claims 1-15 under 35 U.S.C. § 102 as being anticipated by *Piazza et al* (US Patent No. 6,204,857 B1). This rejection is respectfully traversed.

With regard to claims 1, 6, and 11, the Examiner states:

In regards to claim 1, 6, 11, *Piazza* teaches a method and apparatus for generating partial differential equations for perspective corrected texture coordinates, see col. 6, lines 54-62, comprising: calculating texture coordinates at each of four adjacent pixels; see col. 6, lines 60-67, calculating the difference between the texture coordinates; calculating a perspective correction factor based on perspective correction coordinates; and multiplying each texture coordinate difference by the perspective correction factor, see col. 7, lines 1-30.

(*Office Action*, dated April 9, 2003, page 2).

A prior art reference anticipates the claimed invention under 35 U.S.C. §102 only if every element of a claimed invention is identically shown in that single reference, arranged as they are in the claims. *In re Bond*, 910 F.2d 831, 832, 15 U.S.P.Q.2d 1566, 1567 (Fed. Cir. 1990). *Piazza* cited by the Examiner does not anticipate the present invention as recited in amended claim 1, because *Piazza* fails to teach each and every

element of the claim. Amended independent claim 1, which is representative of amended independent claims 6 and 11, reads as follows:

1. A method for generating partial differential equations for perspective corrected texture coordinates, comprising the steps of:
  - a) calculating texture coordinates at each of four adjacent pixels;
  - b) calculating the difference between the texture coordinates;
  - c) calculating a perspective correction factor based on perspective correction coordinates; and
  - d) multiplying each texture coordinate difference by the perspective correction factor;wherein steps a) through d) include sharing data from each of the four adjacent pixels.

Claim 1 recites having the calculating and multiplying steps of claim 1 include sharing data from each of the four adjacent pixels. Claim 1 teaches using the shared data in calculating texture coordinate values at the four adjacent pixels. The values generated are mathematically exact values, because of data that is common among adjacent pixels.

*Piazza* does not teach sharing data from each of the four adjacent pixels. Instead, *Piazza* teaches calculating texture coordinates through interpolation:

Particularly, in the method of the invention, a span of a predetermined number of pixels is defined in pixel (screen space). As described, the designators x and y represent the row (x) and column (y) designation of a pixel (picture element) from a plurality or matrix of pixels of a screen or display device. The pixels of the display device are typically rectangular or square and arranged in horizontal rows and vertical columns for convenience. In the preferred embodiment, the predefined span includes a grid of 4.times.4 pixels. Then, a perspective correct determination of the texture value (u,v) is made at each of four corners of the span, three of the corners being immediately outside the span. As used herein, the designators u and v represent the row (u) and column (v) designation of a texel (texture element or cell) from a plurality of texels of a texture map at a particular LOD. Texels may also be square or rectangular and envisioned to be located in horizontal rows and vertical columns. Then, a linear interpolation technique is performed to approximate the texture values and partial derivatives of texture addresses of each pixel within the span that map to the polygon to be rendered.

(*Piazza*, col. 3, line 66 to col. 4, line 19 (emphasis added)). As can be seen above, the method of generating texture address partial derivatives in *Piazza* includes using interpolation. Interpolation is defined in the Free On-line Dictionary of Computing as:

A mathematical procedure which estimates values of a function at positions between listed or given values. Interpolation works by fitting a "curve" (i.e. a function) to two or more given points and then applying this function to the required input.

(<http://foldoc.doc.ic.ac.uk/foldoc/index.html>). The word *interpolate* means to estimate intermediate values occurring between known values. Thus, performing an interpolation technique results in estimated values rather than exact values. As shown above, *Piazza* teaches defining a span (collection of pixels on a single scan line which lie inside the primitive) and performing a linear interpolation technique using the four corners of the span as the known values. *Piazza* teaches using interpolation to "approximate the texture values and partial derivatives of texture addresses of each pixel within the span." Thus, *Piazza* differs from the present invention as recited in claim 1 by performing interpolation to generate approximate or estimated texture values, instead of using shared data to generate exact texture values.

In sum, the present invention as recited in claim 1 teaches using shared data from each of the four adjacent pixels to generate texture values in order to reduce the number of multiplies and subtracts used to calculate the texture coordinate values. The values generated from the steps recited in claim 1 are mathematically exact values, because of data that is common among adjacent pixels. In contrast, *Piazza* employs an interpolation technique which generates estimated texture values, or simply offers an average of the pixels between known values. Generating average texture coordinate values over a span is not the same as generating exact texture coordinate values using data shared from adjacent pixels.

Furthermore, *Piazza* does not teach, suggest, or give any incentive to make the needed changes to reach the presently claimed invention. *Piazza* actually teaches away from the presently claimed invention because it teaches using interpolation to achieve approximate values for the texture coordinates in the pixels as opposed to using data sharing among the four adjacent pixels to achieve mathematically exact texture coordinate values as in the presently claimed invention. Absent the examiner pointing out some teaching or incentive to implement *Piazza* and using data sharing among the four adjacent pixels to achieve mathematically exact texture coordinate values, one of ordinary skill in the art would not be led to modify *Piazza* to reach the present invention.

when the reference is examined as a whole. Absent some teaching, suggestion, or incentive to modify *Piazza* in this manner, the presently claimed invention can be reached only through an improper use of hindsight using the applicants' disclosure as a template to make the necessary changes to reach the claimed invention.

Therefore, Applicants submit that *Piazza* does not teach all elements of rejected independent claims 1, 6, and 11. Accordingly, Applicants respectfully submit that claims 1, 6, and 11 are patentable over the *Piazza* reference.

Dependent claims 2-5, 7-10, and 12-15 depend from independent claims 1, 6, and 11, respectively. Applicants have already demonstrated claims 1, 6, and 11 to be in condition for allowance. Applicants respectfully submit that claims 2-5, 7-10, and 12-15 are also allowable, at least by virtue of their dependency on allowable claims.

Consequently, it is respectfully urged that the rejection of claims 1-15 has been overcome.

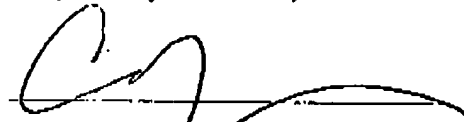
## II. Conclusion

It is respectfully urged that the subject application is patentable over the cited reference and is now in condition for allowance.

The Examiner is invited to call the undersigned at the below-listed telephone number if in the opinion of the Examiner such a telephone conference would expedite or aid the prosecution and examination of this application.

DATE: 7/9/03

Respectfully submitted,



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